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ONTARIO WATER
RESOURCES COMMISSION

ANNUAL REPORT

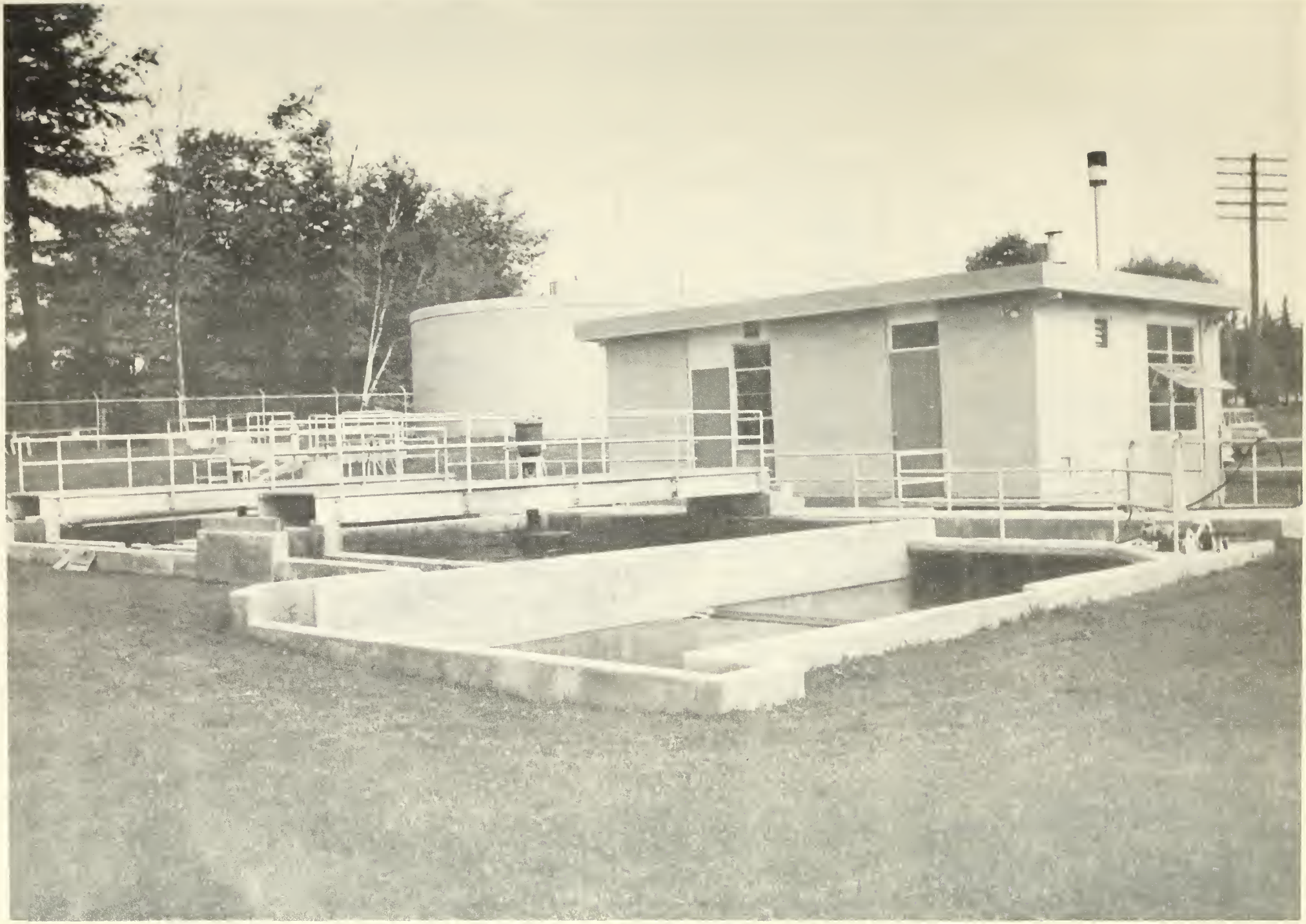
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TOWN OF HUNTSVILLE

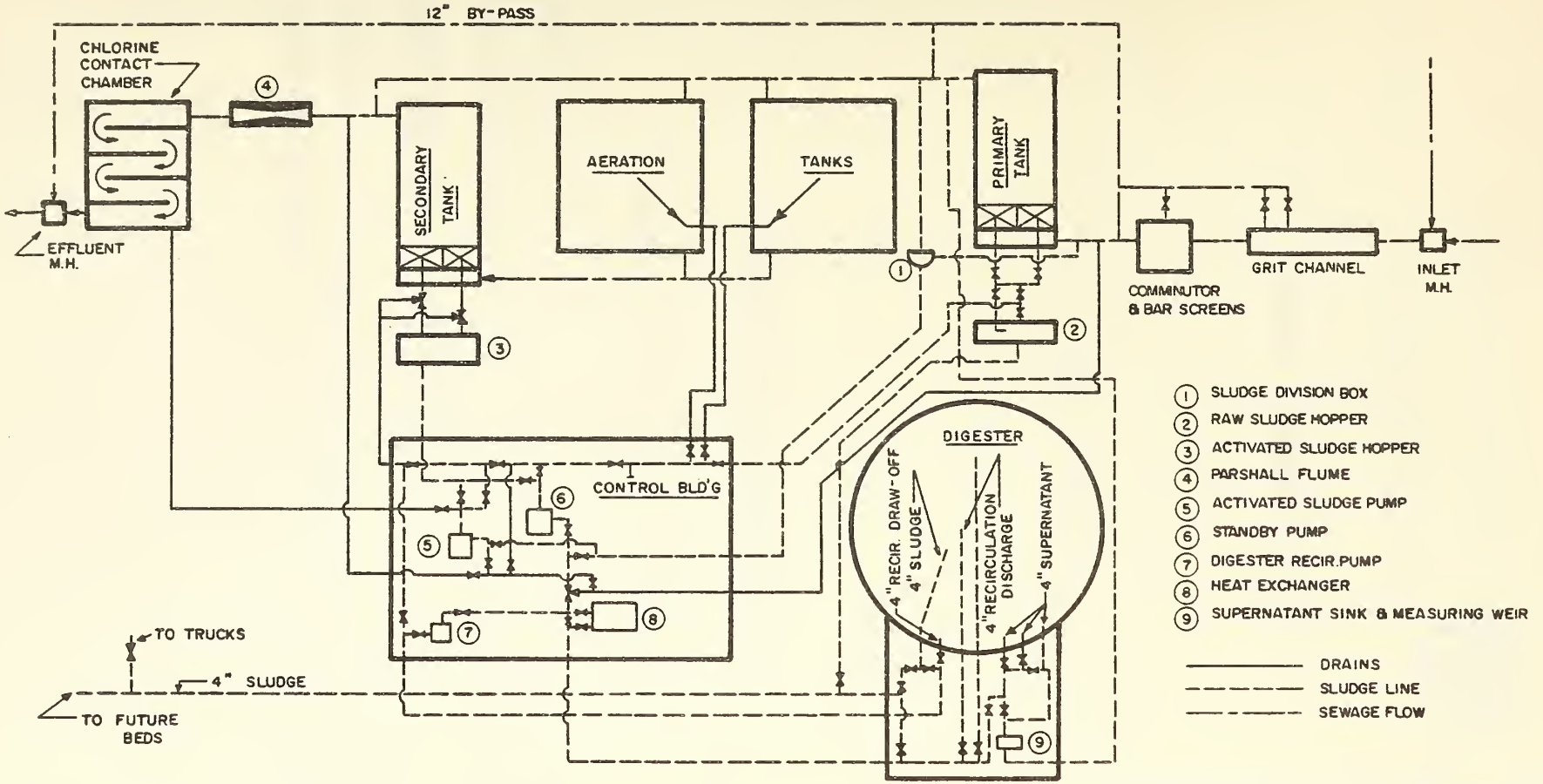
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Huntsville : sewage treatment plant.
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ONTARIO WATER RESOURCES COMMISSION

TOWN OF HUNTSVILLE
S.T.P.
FLOW DIAGRAM

DRAWN BY: P.J.O.	DATE MAY 1960
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H U N T S V I L L E

SEWAGE TREATMENT PLANT

ANNUAL REPORT

1961

DIVISION OF PLANT OPERATIONS

ONTARIO WATER RESOURCES COMMISSION

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Project Engineer - - - - - - - - - - -P.M. Higgins

HUNTSVILLE SEWAGE TREATMENT PLANT

INTRODUCTION

On March 5th, 1957, preliminary discussions were held with officials of the Municipality of Huntsville to discuss proposals for a sewerage system for the town. A report prepared in 1954 by the Consulting Engineering firm of R. V. Anderson and Associates was updated, and on September 10th, 1958 the OWRC issued their certificate of approval for the construction of sanitary sewers, three pumping stations and a sewage treatment plant.

The construction of this project was divided into two parts, Contract "A" and Contract "B". Contract "A" consisted of sanitary sewers and was awarded to Sherk Construction Ltd. for $147,153.87, while Contract "B" consisted of the construction of the sewage treatment plant and pumping stations which was awarded to Foundation Company of Ontario at a cost of $241,871.00. The total cost of the project was $389,024.87.

On November 18th, 1959, the plant was officially put into operation.

SEWERAGE SYSTEM DESCRIPTION

The sewage from the municipality is collected in a number of sanitary and combined sewers. Most of the sewage flow by gravity to one of three pumping stations from which it is directed to the sewage treatment plant.

The sewage enters the plant through a grit removal chamber where the sand is removed. Manually cleaned bar screens are provided for the removal of large foreign objects which would damage

the plant equipment. From the grit channels the sewage flows to the primary clarifiers.

The sewage is settled in the primary clarifier for approximately two hours before passing on to the aeration tanks. During this retention period, organic solids settle out and are collected by a travelling sludge collector and then are pumped to the digester. In the aeration section, the effluent from the primary clarifier is mixed with activated sludge from the secondary clarifier to form "mixed liquor". Air is introduced to the mixed liquor by two Chicago pump mechanical aerators. With properly controlled aeration, a highly settleable sludge floc is formed. The floc is allowed to settle out in the final settling tanks.

The clear sparkling effluent produced in this manner flows over the peripheral weirs of the final clarifier and through a Parshall flume where the total flow is measured. The effluent then flows to the chlorine contact chamber.

During the summer months, the final effluent is chlorinated before being discharged to the Muskoka River, the receiving stream.

The sludge drawn off from the primary tank and pumped to the digester is maintained at a temperature of 90°F. for a period of 28 days. The sludge is mixed and the digester temperature maintained by continually recirculating the liquid through a heat exchanger. Under this controlled environment, anaerobic bacterial action breaks down the raw sludge to a black, odourless liquid. During the process methane gas is produced which is used to heat the digester and control building.

The digested sludge is hauled away by tank truck and dumped on farmers' fields where it makes an excellent soil conditioner.

DESIGN DATA

Plant

1.	Type	activated sludge (mechanical aeration)
2.	Design population	3,000 persons
3.	Per capita flow	100 U.S. gallons/capita/day
4.	Design plant flow	300,000 U.S. gallons/day
5.	5 day BOD of raw sewage 250 ppm. Removal 90-95%.	
	Suspended solids of raw sewage 250 ppm. Removal 90-95%.	

Primary Treatment

1. Screening - (a) provision has been made for the inclusion of a comminutor.

 (b) manually cleaned bar screens with plant by-pass.

2. Grit Removal - 2 parallel channels; volume 52.5 cu. ft. each; detention time two minutes.

3. Primary tank - 1 tank 10'-0 x 30'-0 x 8'-0 side wall depth.
 Surface area - 300 square feet.
 Volume - 24,000 cu. ft.
 Detention period - 1½ hours.
 Surface settling rate - 1,000 U.S. gals/sq. ft. of tank/day.
 Overflow rate 33,000 U.S. gallons/lineal foot of overflow weir/day.

Secondary Treatment

1. Aeration Section 2 tanks 24'-0 square by 12' SWD (approx.)
 Volume - 14,000 cubic feet.
 Retention period 6¾ hours with 25% return sludge.
 8½ hours with 0% return sludge.
 Air supply - mechanical aeration.

2. Final sedimentation - 1 tank 30'-0 x 13'-0 x 12'-0 side wall depth.
Surface area - 390 square feet
Volume - 47,000 cubic feet
Detention period - 3 hours
Surface settling rate 770 U.S. Gallons/square foot/day.
Overflow rate 5,300 U.S. Gallons/lineal foot of overflow weir/day.

3. Chlorination - Maximum dosage - 20 lbs/day
Detention period - 36 minutes

Digestion

1 single stage digester - 30'-0 diameter by approximately 20'-0 side wall depth.

heated digester capacity - 5 cubic feet/capita.

Additional Design Data

This plant is designed to facilitate future construction of identical primary, aeration, final and digestion tanks thereby increasing the plant capacity to 600,000 U.S.G.P.D., capable of serving a population of 6,000 persons.

PLANT OPERATION

The plant was operated during the year 1961 by Mr. E. Diplock. No serious difficulties were experienced in the operation of the plant during the year.

Tables I to IV are a summary of the results of the operations during 1961; 36.273 million gallons of sewage were treated, 245 cubic feet of grit were removed or a removal of 6.7 cubic feet/million gallons, 5958 cubic feet of natural gas were consumed in heating the plant; sewage gas made up the remainder of the fuel to heat the plant.

Table II is a summary of the quality control maintained at the plant. Samples of raw sewage, primary effluent, and final effluent as well as river samples are sent to the OWRC Laboratory on a bi-weekly basis.

A graph is included at the end of this report. This graph is a visual summary of the sewage and effluent strengths at the plant over the course of the year.

The quality of the final effluent is very close to meeting the objectives of the OWRC which are 15 ppm S.S. and 15 ppm BOD in the final effluent.

The BOD count in the final effluent is within the OWRC's objectives. The reason that S.S. is higher is due to surges in the plant caused by low flows and intermittent cycling of the pumping stations. Once the flow to the plant approaches the design figure, there will be a continuous, steady flow through the plant, eliminating the hydraulic phenomenon which presently is carrying some light floc over the weirs of the final tank.

The plant is designed for a removal of from 90-95% of BOD and SS. It is meeting the design expectations with respect to BOD removal and is very close with respect to S.S. removal. The efficiency of suspended solids removal should approach the design expectations as the flow approaches design flow.

Table III is a tabulation of the time in service of the mechanical aerators. The reason for this tabulation was to assess the percentage of the total power consumption of the plant taken by the aerators. It was expected that the aerators would be the greatest power consumers at the plant. This was not the case,

however, as can be seen by the graph comparing aerator power consumption to total plant power consumption. The time in service of the aerators is determined by the plant operator in his day to day testing of the aeration tank mixed liquor.

Table IV is a tabulation of power consumption and costs involved in the operation of the plant and the three pumping stations.

The cost of power per million gallons of sewage treated at the plant was $18.10.

The operating costs at the plant for 1961 were as follows:

		% of Total
Payroll	$ 3,639.68	40.7
Fuel	595.05	6.7
Power	1,273.89	14.3
Chemical	(76.42 cr.)	---
General Supplies	466.11	5.0
Equipment	---	---
Repairs & Maintenance	121.19	1.2
Sundry	2,681.23	30.1
Water	213.76	2.0
TOTAL	8,914.49	100.00

The largest portion of the sundry item is for the removal of sludge.

The expected operating costs for 1962 are:

Payroll	4,040.00
Fuel	800.00
Power	1,400.00

Chemicals	400.00
General Supplies	400.00
Equipment	300.00
Repairs & Maintenance	300.00
Sundry	1,600.00
Contingency	560.00
TOTAL	10,000.00

It cost $246.00 to treat each million gallons of sewage received at the Huntsville plant during 1961.

At present, the plant is operating far below the design loadings. This makes the cost of operation per million gallons quite high. Once the flow to the plant begins to approach the design figure, it may be expected that the cost per million gallons will drop off appreciably.

During 1961, 33 man hours were spent at the Huntsville plant by the Maintenance Section of the Division of Plant Operations; also the project engineer makes periodic inspection visits to the plant -all of this is at no charge to the municipality.

Finally, the Huntsville Sewage Treatment Plant is providing efficient treatment to the wastes of the municipality and is playing an important role in keeping the Muskoka River free from pollution. More efficient and economic treatment can be expected in the future as the flow to the plant increases and approaches its design rating.

HUNTSVILLE OPERATING DATA TABLE I

MONTH	TOTAL FLOW	CUMULATIVE FLOW	GRIT REMOVED	CONSUMPTION OF NAT. GAS
JAN.	0.613	0.613	17 cf.	863
FEB.	0.775	1.388	23 cf.	625
MARCH	1.092	2.480	9 cf.	710
APRIL	2.626	5.106	27 cf.	641
MAY	1.366	6.472	18 cf.	434
JUNE	1.189	7.661	36 cf.	331
JULY	4.429	12.082	47 cf.	246
AUG.	4.910	16.992	23 cf.	206
SEPT.	4.805	21.797	14 cf.	215
OCT.	4.238	26.035	17 cf.	290
NOV.	5.220	31.255	10 cf.	441
DEC.	4.879	36.273	4 cf.	956

SAMPLING RESULTS TABLE II

MONTH	RAW SEWAGE BOD	RAW SEWAGE SS	PRIMARY EFFLUENT BOD	PRIMARY EFFLUENT SS	FINAL EFFLUENT BOD	FINAL EFFLUENT SS	% REDUCTION BOD	% REDUCTION SS
JAN.	157	114	195	78	28	32	81	72
FEB.	118	231	121	157	32	53	72	77
MAR.	90	116	68	64	9	26	90	78
APR.	102	97	64	84	11	24	89	76
MAY	84	72	74	128	4	18	95	75
JUNE	115	230	95	92	6	20	95	91
JULY	180	180	-	-	4	11	98	94
AUG.	210	148	115	50	3	8	98	95
SEPT.	--	--	215	58	14	24	--	--
OCT.	170	246	315	240	23	20	87	91
NOV.	140	346	128	70	16	18	91	95
DEC.	185	158	170	120	18	12	91	93
AVG.	141	176	141	103	14	22	90	88

POWER CONSUMPTION OF MECHANICAL AERATORS TABLE III

MONTH	% OF DAY	HRS. DAY (AVG.)	TOTAL HRS.	TOTAL HRS. AERATION	POWER REQUIRED KWH
JAN.	56.2	13.4	416	832	3100
FEB.	46.5	11.2	314	628	2340
MAR.	48.2	11.6	359	718	2680
APR.	50.8	12.2	378	756	2820
MAY	58.7	14.1	437	874	3260
JUNE	62.6	15.1	453	906	3380
JULY	61.5	14.8	459	918	3420
AUG.	66.5	16.0	492	984	3670
SEPT.	60.0	14.4	433	866	3230
OCT.	47.0	11.3	351	702	2620
NOV.	61.3	14.7	442	884	3300
DEC.	59.5	14.3	443	886	3310

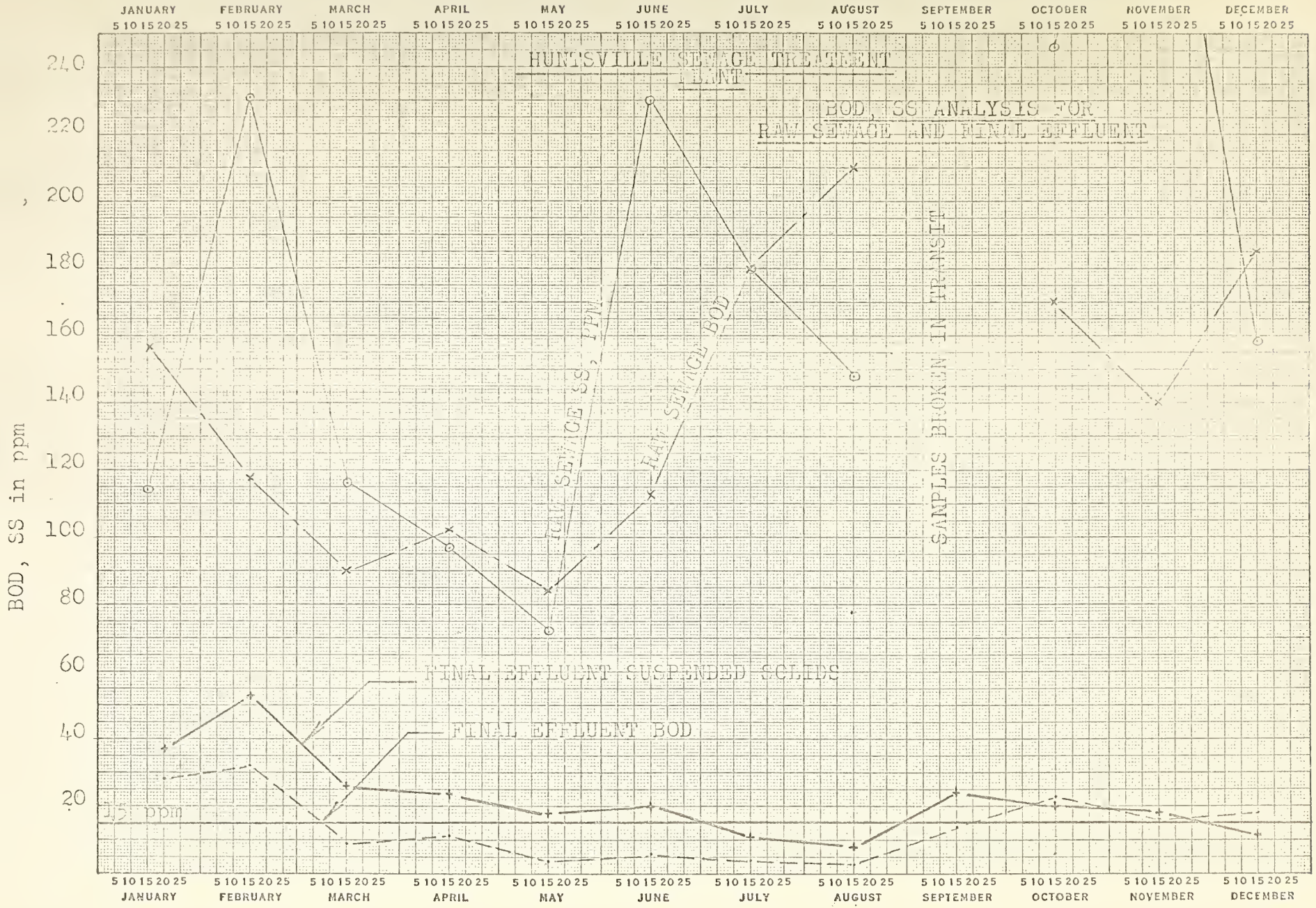
Both aerators powered by a 5 HP motor

5 HP = 745.7 x 5 = 3730 watts or 3.73 KW.

PROJECT POWER CONSUMPTION TABLE IV

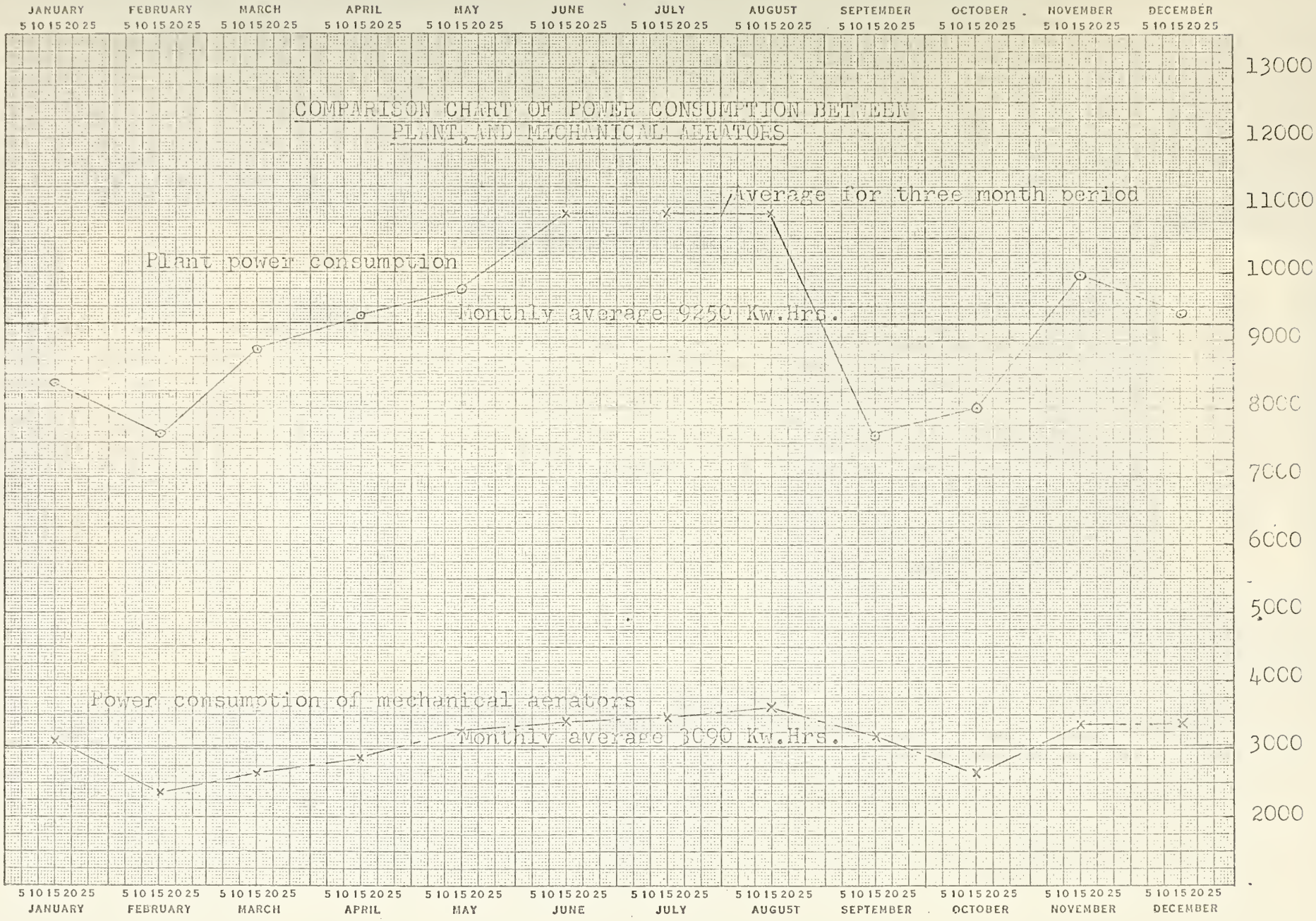
	SEWAGE PLANT		P.S. #1		P.S. #2		P.S. #3	
MONTH	KW HR	COST	KW HR	COST	KW HR.	COST	KW HR	COST
JAN.	8350	50.47	1490	16.30	800	14.84	300	9.99
FEB.	7650		1510		600		90	
MAR.	8850	51.62	1590	17.37	680	15.76	1620	24.39
APR.	9350	56.93	1990	17.25	580	14.28		2.12
MAY	9750	58.01	1150	14.99	720	16.20		1.80
JUNE	17100	75.15	1230	15.20	500	12.60	100	3.78
JULY	3350	38.75	1150	14.99	360	9.16	290	7.86
AUG.	12000	62.10	1270	15.31	460	11.81	310	8.26
SEPT.	7550	50.09	1160	15.80	280	8.43	240	6.82
OCT.	8000	55.26	1452	16.99	260	7.49	360	9.11
NOV.	9950	60.53	1750	17.40	870	15.80	470	10.99
DEC.	9350	52.97	1990	18.05	840	15.23	600	12.71
TOTAL	111250	662.38	17732	179.65	6950	141.60	4380	97.83

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KEUFFEL & ESSER CO. MADE IN U.S.A.
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